

Claimed is:

1. An optoelectronic receiver comprising:
a linear circuit comprising a tunable filter having a transfer function; and
a control circuit electrically connected to the tunable filter, the control circuit connected to one or more sensors which sense one or more operational conditions;
5 wherein the control circuit generates a control signal that is a function of the one or more sensed operational conditions, and the control signal is input to the tunable filter which adjusts the linear circuit's transfer function based on the control signal.
2. The optoelectronic receiver of claim 1 wherein the linear circuit comprises a photodiode electrically connected to an amplifier, and the tunable filter electrically connected to the amplifier wherein the amplifier receives an output signal from the photodiode and provides an amplified signal to the tunable filter.
3. The optoelectronic receiver of claim 1 wherein the operational conditions are selected from the group consisting of temperature, photocurrent, optical input light, bit-rate, wavelength, quasi-bit-error-rate and bit-error-rate.
4. The optoelectronic receiver of claim 1 wherein the control circuit comprises one or more of the following: resistor array, counter/decoder and memory.
5. The optoelectronic receiver of claim 1 wherein the photodiode is an avalanche photodiode.
6. The optoelectronic receiver of claim 1 wherein the control circuit comprises a digitally controlled variable resistor.
7. The optoelectronic receiver of claim 1 wherein the tunable filter comprises a three-pole filter.
8. The optoelectronic receiver of claim 1 wherein the tunable filter comprises one or more filter bandwidth determining elements.

9. The optoelectronic receiver of claim 1 wherein the tunable filter comprises one or more varactors.

10. The optoelectronic receiver of claim 1 wherein the control circuit comprises a tunable DC voltage source.

11. The optoelectronic receiver of claim 1 wherein the control circuit comprises:
a reference voltage source;
one or more comparators;
a first voltage divider electrically connected to the reference voltage source and the one or

more comparators; and

a second voltage divider electrically connected to the one or more comparators;

wherein the one or more comparators compare a signal from the sensor(s) with a reference voltage output by the first voltage divider and modifies the reference voltage to substantially equal a predetermined optimum control voltage which is input to the second voltage divider, the second voltage divider outputs a signal to the tunable filter, thus modifying the linear circuit transfer function according to the conditions determined by the sensor(s).

12. The optoelectric receiver of claim 1 further comprising a second filter connected between the tunable filter and the control circuit.

13. A method of adjusting an optoelectronic signal in a linear circuit according to operating conditions, the linear circuit having a tunable filter, wherein the method comprises:
sensing one or more operating conditions;

providing a control signal that is a function of the operating conditions;

inputting into the tunable filter the control signal; and

adjusting by the tunable filter the transfer function of the linear circuit based on the control signal.

14. The method of claim 13 further comprising filtering, at least partially, noise from the control signal prior to inputting the control signal to the tunable filter.

15. An optoelectronic communication system comprising an optoelectronic receiver according to claim 1.

16. An integrated circuit comprising an optoelectronic receiver according to claim 1.

17. A method of adjusting an optoelectronic signal in a linear circuit according to operating conditions, the linear circuit having a tunable filter, wherein the method comprises:

- a. selecting a control voltage V_n from a first memory location wherein $n=1, 2, 3...$;
- b. delaying for a time period to allow the control voltage to settle;
- c. measuring the bit-error-rate BER_n at the selected control voltage;
- d. determining whether $n \leq n_{max}$;
- e. if $n \leq n_{max}$ then incrementing n by 1 and selecting from the first memory location a control

voltage corresponding to the incremented n value then returning to step c;

- f. if $n \not\leq n_{max}$ then finding the minimum bit-error-rate BER_m from $BER_1...BER_{n_{max}}$ in a second

memory location;

- g. finding a target control voltage V_m from the first memory location for $n=m$;

h. sending the target control voltage V_m to the tunable filter, thereby causing the transfer function of the linear circuit to be adjusted according to the operating conditions.

18. A method of adjusting an optoelectronic signal in a linear circuit according to operating conditions, the linear circuit having a tunable filter, wherein the method comprises:

- a. selecting from a first memory location a control voltage V_n ;

- b. delaying for a first time period to allow the control voltage to settle;
- 5 c. measuring the bit-error-rate, BER_n ;
- d. selecting ΔV and tolerance T from a second and third memory location, respectively;
- e. incrementing the control voltage by ΔV so that $V_{n+1} = V_n + \Delta V$;
- f. delaying for a second time period to allow the control voltage to settle;
- g. measuring the bit-error-rate, BER_{n+1} ;
- 10 h. comparing $|BER_{n+1} - BER_n|$ and T ;
- i. if $|BER_{n+1} - BER_n| > T$ then comparing BER_n to BER_{n+1} ;
- j. if in step i, $BER_{n+1} > BER_n$ then changing the sign of ΔV and returning to step e;
- k. if in step i, $BER_{n+1} < BER_n$ then returning to step e;
- l. if in step h, $|BER_{n+1} - BER_n| \leq T$, then saving the control voltage V_{n+1} as the target voltage
- 15 in the first memory location; and
- m. sending the target control voltage V_{n+1} to the tunable filter causing the transfer function of the linear circuit to be adjusted according to the operating conditions.